

WHAT IS CLAIMED IS:

1. An optical glass having a refractive index  $n_d$  of at least 1.875, an Abbe's number  $v_d$  of at least 39.5 and a glass transition point  $T_g$  of 700°C or lower.

2. The optical glass of claim 1, which is a borosilicate glass comprising at least one selected from  $\text{La}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$  or  $\text{Yb}_2\text{O}_3$  and at least one selected from  $\text{ZrO}_2$ ,  $\text{Ta}_2\text{O}_5$  or  $\text{Nb}_2\text{O}_5$ , wherein the weight ratio of the total content of  $\text{La}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$  and  $\text{Yb}_2\text{O}_3$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 2 to 4 and the weight ratio of the total content of  $\text{ZrO}_2$ ,  $\text{Ta}_2\text{O}_5$  and  $\text{Nb}_2\text{O}_5$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 1 to 2.

3. The optical glass of claim 2, which further contains  $\text{ZnO}$  whose weight ratio to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is more than 0 but not more than 2.

4. The optical glass of claim 3, wherein the weight ratio of the total content of  $\text{La}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$  and  $\text{Yb}_2\text{O}_3$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 2 to 4, the weight ratio of the total content of  $\text{ZrO}_2$ ,  $\text{Ta}_2\text{O}_5$  and  $\text{Nb}_2\text{O}_5$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 1 to 2 and the weight ratio of  $\text{ZnO}$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 0.1 to 0.5.

5. The optical glass of claim 1, which has a glass composition comprising, by % by weight, 3 to 10 % of  $\text{SiO}_2$ , 7 to 15 % of  $\text{B}_2\text{O}_3$ , 0 to 5 % of  $\text{GeO}_2$ , 0 to 15 % of  $\text{ZnO}$ , 30 to 60 % of  $\text{La}_2\text{O}_3$ , 0 to 30 % of  $\text{Gd}_2\text{O}_3$ , 0 to 10 % of  $\text{Y}_2\text{O}_3$ , 0 to 5 % of  $\text{Yb}_2\text{O}_3$ , 2 to 8 % of  $\text{ZrO}_2$  and 13 to 19 % of  $\text{Ta}_2\text{O}_5$ , wherein the total content of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{GeO}_2$  is 14 to 20 % by weight, the total content of  $\text{B}_2\text{O}_3$  and  $\text{ZnO}$  is at least 9 % by weight, the total content of  $\text{La}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$  and  $\text{Yb}_2\text{O}_3$  is 50 to 60 % by weight and the total content of the above components is at least 95 % and further wherein the composition contains, by % by weight, 0 to 1 % of  $\text{Li}_2\text{O}$  and 0 to 3 % of  $\text{Nb}_2\text{O}_5$ .

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6. The optical glass of claim 5, which contains, by % by weight, 9 to 12 % of  $B_2O_3$  and 1 to 7 % of  $ZnO$  and has a  $B_2O_3$  and  $ZnO$  total content of at least 12 % by weight.

5 7. The optical glass of claim 5 or 6, which contains, by % by weight, 6 to 9 % of  $SiO_2$ , 9 to 12 % of  $B_2O_3$  and 0 to 5 % of  $GeO_2$  and has an  $SiO_2$ ,  $B_2O_3$  and  $GeO_2$  total content of 16 to 19 % by weight.

10 8. The optical glass of claim 1, which has a glass composition comprising, by % by weight, 5 to 10 % of  $SiO_2$ , 7 to 13 % of  $B_2O_3$ , 0 to 5 % of  $GeO_2$ , 0 to 15 % of  $ZnO$ , 30 to 60 % of  $La_2O_3$ , 0 to 30 % of  $Gd_2O_3$ , 0 to 5 % of  $Y_2O_3$ , 0 to 5 % of  $Yb_2O_3$ , 2 to 8 % of  $ZrO_2$  and 13 to 19 % of  $Ta_2O_5$ , wherein the total content of  $SiO_2$ ,  $B_2O_3$  and  $GeO_2$  is 14 to 20 % by weight, the total content of  $B_2O_3$  and  $ZnO$  is at least 9 % by weight and the total content of  $La_2O_3$ ,  $Gd_2O_3$ ,  $Y_2O_3$  and  $Yb_2O_3$  is 50 to 60 % by weight, and further wherein the total content of the above components exceeds 95 % by weight, the composition further contains, by % by weight, 0 to 3 % of  $Nb_2O_3$ , 0 to 3 % of  $WO_3$ , 0 to 3 % of  $Al_2O_3$ , 0 to 3 % of  $Bi_2O_3$ , 0 to 3 % of  $Ga_2O_3$  and 0 to 1 % of  $Sb_2O_3$ , the total content of  $BaO$ ,  $SrO$ ,  $K_2O$  and  $MgO$  is 0 to 3 % by weight, and the total content of  $Na_2O$ ,  $K_2O$  and  $Li_2O$  is 0 to 1 % by weight.

9. An optical glass which is a borosilicate glass comprising at least one selected from  $La_2O_3$ ,  $Gd_2O_3$ ,  $Y_2O_3$  or  $Yb_2O_3$  and at least one selected from  $ZrO_2$ ,  $Ta_2O_5$  or  $Nb_2O_5$ , wherein the weight ratio of the total content of  $La_2O_3$ ,  $Gd_2O_3$ ,  $Y_2O_3$  and  $Yb_2O_3$  to the total content of  $SiO_2$  and  $B_2O_3$  is from 3.2 to 5 and the weight ratio of the total content of  $ZrO_2$ ,  $Ta_2O_5$  and  $Nb_2O_5$  to the total content of  $SiO_2$  and  $B_2O_3$  is from 1.1 to 1.5, and which has a refractive index  $nd$  of at least 1.875 and an Abbe's number  $vd$  of at least 39.5.

10. An optical glass which is a borosilicate glass comprising at least one selected from  $La_2O_3$ ,  $Gd_2O_3$ ,  $Y_2O_3$  or  $Yb_2O_3$ , at least one selected from  $ZrO_2$ ,  $Ta_2O_5$  or  $Nb_2O_5$  and  $ZnO$ ,

wherein the weight ratio of the total content of  $\text{La}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$  and  $\text{Yb}_2\text{O}_3$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 2 to 5, the weight ratio of the total content of  $\text{ZrO}_2$ ,  $\text{Ta}_2\text{O}_5$  and  $\text{Nb}_2\text{O}_5$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is from 0.5 to 3  
5 and the weight ratio of  $\text{ZnO}$  to the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is at least 0.14, and which has a refractive index  $n_d$  of at least 1.875 and an Abbe's number  $v_d$  of at least 39.5.

11. The optical glass of claim 9 or 10, which has a glass  
10 composition comprising, by % by weight, 3 to 10 % of  $\text{SiO}_2$ , 7 to 15 % of  $\text{B}_2\text{O}_3$ , 0 to 5 % of  $\text{GeO}_2$ , 0 to 15 % of  $\text{ZnO}$ , 30 to 60 % of  $\text{La}_2\text{O}_3$ , 0 to 30 % of  $\text{Gd}_2\text{O}_3$ , 0 to 10 % of  $\text{Y}_2\text{O}_3$ , 0 to 5 %  
15 of  $\text{Yb}_2\text{O}_3$ , 2 to 8 % of  $\text{ZrO}_2$  and 13 to 19 % of  $\text{Ta}_2\text{O}_5$ , wherein the total content of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{GeO}_2$  is 14 to 20 % by weight,  
20 the total content of  $\text{B}_2\text{O}_3$  and  $\text{ZnO}$  is at least 9 % by weight and the total content of  $\text{La}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Y}_2\text{O}_3$  and  $\text{Yb}_2\text{O}_3$  is 50 to 60 % by weight, and further wherein the total content of the above components exceeds 95 % by weight and the glass composition contains 0 to 1 % by weight of  $\text{Li}_2\text{O}$  and 0 to 3 % by weight of  $\text{Nb}_2\text{O}_5$ .

12. The optical glass of claim 11, which contains, by % by weight, 9 to 12 % of  $\text{B}_2\text{O}_3$  and 1 to 7 % of  $\text{ZnO}$  and has a total content of  $\text{B}_2\text{O}_3$  and  $\text{ZnO}$  of at least 12 % by weight.  
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13. The optical glass of claim 11 or 12, which contains, by % by weight, 6 to 9 % of  $\text{SiO}_2$ , 9 to 12 % of  $\text{B}_2\text{O}_3$  and 0 to 5 % of  $\text{GeO}_2$  and has an  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{GeO}_2$  total content of 16 to 19 % by weight.  
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14. An optical glass comprising, by % by weight, 3 to 10 % of  $\text{SiO}_2$ , 7 to 15 % of  $\text{B}_2\text{O}_3$ , 30 to 60 % of  $\text{La}_2\text{O}_3$ , 2 to 8 % of  $\text{ZrO}_2$  and 13 to 19 % of  $\text{Ta}_2\text{O}_5$ , wherein the total content of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$  is 14 to 20 % by weight, and the total content of the above components is at least 95 % by weight.  
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15. The optical glass of claim 14, wherein part of  $\text{La}_2\text{O}_3$  is replaced with  $\text{Gd}_2\text{O}_3$  and/or  $\text{Y}_2\text{O}_3$ , the content of  $\text{Gd}_2\text{O}_3$  is 0

to 30 % by weight, the content of  $\text{Y}_2\text{O}_3$  is 0 to 10 % by weight, the optical glass containing 0 to 15 % by weight of  $\text{ZnO}$ , and further wherein the total content of  $\text{ZnO}$  and  $\text{B}_2\text{O}_3$  is at least 9 % by weight, the optical glass having a glass transition point  $T_g$  of 700°C or lower.

16. The optical glass of claim 14, wherein part of  $\text{La}_2\text{O}_3$  is replaced with  $\text{Gd}_2\text{O}_3$  and/or  $\text{Y}_2\text{O}_3$ , the content of  $\text{Gd}_2\text{O}_3$  is 0 to 30 % by weight, the content of  $\text{Y}_2\text{O}_3$  is 0 to 10 % by weight, the content of  $\text{ZnO}$  is 0 to 15 % by weight, the content of  $\text{Nb}_2\text{O}_5$  is 0 to 3 % by weight and the content of  $\text{Li}_2\text{O}$  is 0 to 1 % by weight, the optical glass having a glass transition point  $T_g$  of 700°C or lower.

17. A glass preform made of the optical glass recited in claim 1, 9, 10 or 14.

18. An optical product made of the optical glass recited in claim 1, 9, 10 or 14.

19. A process for the production of the optical product recited in claim 18, which comprises the steps of melting raw materials for a glass and directly press-molding a molten glass.

20. The process of claim 19, which further comprises the step of annealing a glass molded material obtained by the press-molding, after the step of directly press-molding a molten glass.

21. A process for the production of an optical product, which comprises the steps of softening the glass preform recited in claim 17 under heat and press-molding the glass preform softened under heat.

22. The process of claim 21, which further comprises the step of annealing a glass molded material obtained by the press-molding, after the step of press-molding the glass

preform.